

WHAT IS CLAIMED IS:

1. A method for treating degenerative skin conditions in a subject in need thereof, said method comprising applying at least one electric pulse to the surface of a region of skin substantially contemporaneously with application thereto of a composition comprising L-ascorbic acid, or a cosmetically/pharmaceutically acceptable salt, ester or reducing derivative thereof, said electric pulse having sufficient strength and duration to deliver an effective amount of the L-ascorbic acid or the derivative thereof through the stratum corneum of the region of skin, thereby improving the condition of the region of skin without substantial pain or skin irritation.
2. The method according to claim 1 whereby production of collagen is enhanced in the region of skin.
3. The method according to claim 1 wherein the level of free oxygen radicals is reduced in the region of skin.
4. The method according to claim 1 wherein the concentration of L-ascorbic acid, or the derivative thereof, in the composition is in the range from about 1% to about 35% by volume.
5. The method according to claim 1 wherein the composition is formulated as a cream or lotion.
6. The method according to claim 1 wherein the composition is formulated as an emulsion, a crystal suspension, or the L-ascorbic acid, or the derivative thereof, is encapsulated in liposomes or microspheres.
7. The method according to claim 1 wherein the composition is formulated as an aqueous solution or suspension.

8. The method according to claim 1 wherein the electrical pulse is monopolar or bipolar.
9. The method according to claim 1 wherein the electric pulse has a voltage from about 25 volts to about 120 volts.
10. The method according to claim 9 wherein the electric pulse has a voltage from about 50 volts to about 80 volts.
11. The method according to claim 1 wherein a plurality of the electric pulses are applied.
12. The method according to claim 11 wherein the plurality of pulses comprises at least one train of from about 1 to about 30 pulses.
13. The method according to claim 12 wherein a plurality of the trains is applied.
14. The method according to claim 11 wherein the time interval between the plurality of pulses is in the range from about 0.1 sec to about 15 sec.
15. The method according to claim 1 wherein the pulse duration is in the range from about 10 μ sec to about 100 msec.
16. The method according to claim 13 wherein the pulse duration is in the range from about 500 μ sec to about 50 msec.
17. The method according to claim 15 wherein the pulse duration is in the range from about 2.0 msec to about 20 msec.

26. The method according to claim 25 wherein the enhancing involves application to the region of skin of a chemical enhancer or microdermalabrasion.

27. The method according to claim 1 further comprising iontophoresis.

28. A method for electroporation-enhanced dermatological delivery of L-ascorbic acid through the stratum corneum of a subject in need thereof, said method comprising applying at least one electric pulse to the surface of a region of skin substantially contemporaneously with application thereto of a composition comprising ascorbic acid, or a cosmetically/pharmaceutically acceptable salt, ester or reducing derivative thereof, said electric pulse having sufficient strength and duration to topically deliver an effective amount of the L-ascorbic acid or the derivative to the region of skin.

29. A method according to claim 28 wherein the delivery is without substantial pain or skin irritation.

30. The method according to claim 28 wherein the concentration of L-ascorbic acid or the derivative thereof in the composition is in the range from about 20% to about 33% by volume.

31. The method according to claim 28 wherein the composition is formulated as a cream or lotion.

32. The method according to claim 28 wherein the composition is formulated as an emulsion, a crystal suspension, or the L-ascorbic acid or the derivative is encapsulated in liposomes or microspheres.

33. The method according to claim 28 wherein the composition is formulated as an aqueous solution or suspension.

00555330-00701
702350-0000000

34. The method according to claim 28 wherein the electrical pulse is monopolar or bipolar.

35. The method according to claim 28 wherein the electric pulse has a voltage from about 25 volts to about 120 volts.

36. The method according to claim 28 wherein the electric pulse has a voltage from about 50 volts to about 80 volts.

37. The method according to claim 28 wherein a plurality of the electric pulses are applied.

38. The method according to claim 37 wherein the plurality of pulses comprises at least one train of from about 1 to about 10 pulses.

39. The method according to claim 38 wherein a plurality of the trains is applied.

40. The method according to claim 38 wherein the time interval between the plurality of pulses is in the range from about 0.1 sec to about 15 sec.

41. The method according to claim 28 wherein the pulse duration is in the range from about 100 μ sec to about 100 msec.

42. The method according to claim 41 wherein the pulse duration is in the range from about 500 μ sec to about 50 msec.

43. The method according to claim 28 wherein the pulse duration is in the range from about 2.0 msec to about 20 msec.

44. The method according to claim 28 wherein the region of skin is on the face, hand, arm, neck, chest, or leg, and the composition is formulated as a cream or lotion.

45. The method according to claim 44 wherein the electric pulse has a voltage of about 60 volts to about 80 volts and a duration in the range from about 2.7 msec to about 20 msec.

46. The method according to claim 28 wherein the region of skin is on the face, hand, arm, neck, chest, or leg and the composition is formulated as an aqueous suspension or solution.

47. The method according to claim 46 wherein the electric pulse has a voltage up to about 50 volts and a duration of up to 2 msec.

48. The method according to claim 28 wherein the pH of the composition is in the range from about 4.0 to about 5.0 and delivery of the L-ascorbic acid or the derivative thereof is enhanced up to three-fold as compared with passive delivery thereof.

49. The method according to claim 28 wherein the derivative is L-ascorbic acid -2-phosphate or magnesium ascorbyl phosphate.

50. The method according to claim 28 wherein the pH of the composition is in the range from about 1.85 to about 3.9 and the topical delivery of the L-ascorbic acid or the derivative thereof is enhanced about 30% to about 50% as compared with passive delivery thereof.

51. The method according to claim 28 further comprising iontophoresis.

52. The method according to claim 28 wherein the topical delivery enhances production of collagen in the region of skin.

53. The method according to claim 28 wherein the topical delivery reduces the level of free oxygen radicals in the region of skin.

54. The method according to claim 28 further comprising chemically or mechanically enhancing the permeability of the stratum corneum.

55. The method according to claim 54 wherein the enhancing involves application to the region of skin of a chemical enhancer or microdermalabrasion.

56. The method according to claim 28 further comprising iontophoresis.

57. A handheld pulser for use as an electroporation apparatus, said pulser comprising:

- a) a support member, and
- b) an electrode having an optional electrically conductive cover, wherein said support member is of a size and shape to be handheld, and wherein said electrode is attached to said support member and is operatively connected to a pulse generator.

58. A handheld pulser according to claim 57, wherein said pulse generator is contained within said support member.

59. A handheld pulser according to claim 57, wherein said electrode is detachable from said support member.

60. A handheld pulser according to claim 57, wherein said electrode comprises a porous reservoir for said therapeutic agent.

61. A handheld pulser according to claim 57, wherein said electrode cover is absorbent.

62. A handheld pulser according to claim 57, further comprising a detachable electrode mounting bracket.

63. A handheld pulser according to claim 62, wherein said detachable electrode mounting bracket has said electrode detachably adhered thereto.

64. A handheld pulser according to claim 62, wherein said electrode mounting bracket is square, round, contoured, or tube shaped.

65. A handheld pulser according to claim 64, wherein said tube shaped electrode mounting bracket has a central core comprising an axle, about which said electrode mounting bracket is rotatable.

66. A handheld pulser according to claim 61, wherein said electrode comprises an adhesive layer for attachment of said electrode to said electrode mounting bracket.

67. A handheld pulser according to claim 57, wherein said electrode is disposable.

68. A handheld pulser according to claim 57, wherein said electrode is a meander type electrode or a micropatch electrode.

69. A handheld pulser according to claim 68, said meander type electrode comprising an interweaving array of electrically conductive electrode fingers coated on a thin film.

70. A handheld pulser according to claim 69, said electrode fingers having a width of about 2mm, and wherein said electrode fingers are separated by a gap of about 0.2 mm.

71. A handheld pulser according to claim 57, wherein said pulse generator is powered by a battery, optionally contained within said support member.

72. A handheld pulser according to claim 57, wherein a portion of said support member is electrically conductive.

73. A handheld pulser according to claim 72, wherein said electrically conductive portion of said support member functions as a return conductor for said electrode when a conductive material is disposed between said electrode and said electrically conductive portion of said support member.

74. A handheld pulser according to claim 57, further comprising an injection means.

75. A handheld pulser according to claim 72, wherein said injection means comprises a hollow needle, in fluid communication with a reservoir for said therapeutic agent.

76. A handheld pulser according to claim 57, further comprising a vibrating unit.

77. A handheld pulser according to claim 57, further comprising a phonophoresis unit.

78. A handheld pulser according to claim 57, further comprising a pressure sensor unit.

80. A handheld pulser according to claim 57, wherein the handheld pulser is modified to a tableheld pulser.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2
--	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	---